# PUBLIC WORKS DEPARTMENT

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March 1, 2013

VIA E-MAIL AND MAIL
Ms. Denny Dart, Manager
Water Technical Unit
USEPA REGION 1 - New England
5 Post Office Square, Suite 100
Boston, MA 02109-3912

MAR - 1 2013

**RE: City of Portsmouth NPDES Permit No. NH0100234**
**Consent Decree No. 09-cv-283-PB (as modified)**
**Waste Water Master Plan Phase 2 Initial Piloting Technical Memorandum dated September 27, 2012**

Dear Ms. Dart:

Thank you for your letter of January 30, 2013. This letter constitutes an initial response to some of the comments and questions contained in your letter of January 30, 2013. Although your letter requests the City's comments and answers within 30 days of receipt, the Consent Decree provides the City with 45 days to respond. (See, Consent Decree ¶ 16). A number of EPA's questions require the City's engineering consultant, AECOM, to review and analyze/re-analyze data sets. This effort takes time and AECOM is presently one of two finalists in the City's selection process for an engineering firm to commence final design for the Peirce Island Wastewater Treatment Facility (WWTF). The full 45 days anticipated by the Consent Decree are necessary to complete most of the analyses requested. We will assume that the formal response date of March 15, 2013 is acceptable unless advised otherwise.

General Comments

At the outset, let me state that the City was disappointed with your communication. The City has been working diligently to move forward with the design of a secondary WWTF on Peirce Island as expeditiously as practicable. As you are aware, the design and construction of a WWTF upgrade on a constricted island location with the complicating requirement to maintain the operation of the existing WWTF throughout the entire construction process presents significant challenges. The design challenges are further complicated by the fact that the City has a combined collection system; the present WWTF at Peirce Island treating both dry and wet weather flows.

The biggest challenge for the design process, however, continues to be the uncertain regulatory environment. In the ideal world, there would be little regulatory uncertainty over the projected life span of the facility. Instead, the parties dispute the basic science upon which the agency is basing some of its recent actions. In addition, EPA continues to question the proposed flows and loads, which is fundamental information needed to commence the design process.

If the City and regulators are able to reach agreement with regard to the conditions of a NPDES permit for the Peirce Island WWTF as well as resolve the design related issues, it would facilitate the City's completion of the design process on schedule. While certainly the City has been cognizant that the design of the new secondary treatment facilities should be able to accommodate some changes in regulatory requirements over the course of the life span of the facility, the suggestion in your letter for all effluent from the upgraded treatment plant to meet a monthly average total nitrogen of 8 mg/l is a different goal than that required by the referenced Consent Decree.

The Consent Decree was entered into on or about September 24, 2009 and was based upon the Complaint seeking to enforce the NPDES permit issued to the City on April 10, 2007. That permit required the City to design and construct secondary treatment at its Peirce Island WWTF to meet the standards in the 2007 permit. The Consent Decree was recently modified by a filing dated July 2, 2012 and approved by the court on February 15, 2013, only two weeks ago. That modification required the City to commence final design of secondary treatment facilities by July 1, 2013 and to achieve compliance with secondary treatment limits for BOD and TSS contained in the 2007 NPDES permit by May 1, 2017. The Consent Decree timeframe does not require the City to have nutrient treatment operational in the plant being constructed. Designing and constructing for nutrient removal adds a significant level of complexity and effort in the design, construction and start-up phases. This is the reason that the parties agreed that the Consent Decree modification would focus only on secondary treatment and would not include nutrient treatment requirements.

While under some circumstances, the City may be able to make critical design decisions without the benefit of a draft NPDES permit, it is not evident at this point that the City could do so here. In accordance with the modified Consent Decree, on September 27, 2012, the City timely submitted its Piloting Technical Memorandum which set forth among other things that it recommended sizing the Peirce Island secondary treatment system to treat an annual average flow of 6.13 million gallons per day, a maximum monthly flow of 8.86 mgd and a maximum daily flow of 9.06 mgd. That Piloting Technical Memorandum also outlined the City's intended method for addressing wet weather flows. None of the assumptions set forth in the Piloting Technical Memorandum should have come as a surprise to EPA given the prior conversations the City and its consultants have had on these issues over the course of the last two years. The City did not receive a written response to the Piloting Technical Memorandum from

EPA until the January 30, 2013 correspondence. This recent correspondence suggests that there are many issues unresolved and which are the subject of significantly different views. The City is not without hope, however, that progress can be made and perhaps the more detailed response that the City will provide by March 15, 2013 will move the parties in that direction.

In addition, the City points out that a draft permit will set forth the factual basis not contained in your letter of January 30, 2013 for the limits to be established in the permit and that factual basis will be important to the City's analysis. Based upon current information, it would be difficult for the City to justify the millions of dollars in proposed expenditures on statements in non-binding communications such as the July 31, 2012 letter to which you refer. In addition, as you are aware, a draft permit is simply that and the final permit may be affected by comments and challenges by the City and others that can lead to substantial modification of draft terms and conditions.

Comments Specific to Certain Numbered Questions:

With regard to Question 1 (a), the City does not believe that such an analysis would be fruitful. First, AECOM, due to its other commitments, could not complete the analysis within the time prescribed. Second, the City does not believe that a monthly average total nitrogen limit of 8 mg/l could be justified. Both Exeter and Newmarket have been issued permits with a seasonal rolling average, which is more appropriate. Moreover, the most recent communication from Professors Langan & Jones from UNH indicates that EPA's present position of 8 mg/l monthly average is untenable. Attached is the referenced communication and original letter to the professors from the Mayors of Dover, Portsmouth and Rochester.

The City cannot respond to question 2 (b) without clarification. The question does not indicate the flow and load that would be treated at this hypothetical secondary treatment system. Theoretically the City could replace the entire area of public trails, parking areas, boat launch, public pool and historic monuments on the island with wastewater treatment system facilities. Perhaps that was not the intent of the question. If EPA has a certain flow and load in mind, the City will reconsider the question. The City will follow up this letter with a telephone call to Joy Hilton with whom Terry Desmarais has already been in contact regarding matters raised by EPA's communication.

Finally while the EPA has signaled its intent to require a total nitrogen limit, the City points out that secondary treatment alone will significantly reduce BOD, TSS and Nitrogen discharged into the Piscataqua River. The City is committed to meeting the requirements of the Clean Water Act. We look forward to discussing these points with you.

Very truly yours,

Peter H. Rice, P.E.
Deputy Director of Public Works

Enclosure: Langan/ Jones Letter 2/19/13
Mayors Letter 1/1/13

cc: David S. Allen, Deputy City Manager
Terry Desmarais, City Engineer
Suzanne M. Woodland, Assistant City Attorney
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Brian Pitt, EPA-OEP
Michael Cobb, EPA-OEP
Michael Wagner, Esq, EPA
Joy Hilton, EPA
Tom Irwin, CLF
Jon Pearson, AECOM

received
2/21/13

UNIVERSITY of NEW HAMPSHIRE

February 19, 2013

Eric Spear, Mayor
City of Portsmouth

Dean Trefethen, Mayor
City of Dover

T.J. Jean, Mayor
City of Rochester

Dear Mayors Spear, Trefethen, and Jean;

We are writing to you in response to your request for input on research and monitoring in the Great Bay Estuary. Please accept our apologies for taking so long to respond. As University of New Hampshire professors, we feel it is part of our mission to provide technical information to citizens and municipal officials in cases where we have the knowledge and expertise to do so. In your letter, you cite claims attributed to the USEPA regarding conditions and cause and effect scenarios in the estuary. We are curious how these claims were expressed by EPA and would be interested in seeing the original documents from which they were excerpted if you are wiling to share them.

Regarding the questions you have posed, first of all, we were either principal investigators on studies that pertain to your questions, or have been involved in written review studies or lengthy discussions of all studies as part of PREP TAC and other meetings. Secondly, because of the way your questions are worded and your request that they focus solely on studies that have been conducted in 'this system, e.g., the Great Bay Estuary, the answers for most of the questions would be "no" with some qualifiers for a few of them. This is a function of two facts, the first of which is that most data used to frame our understanding of how nutrient dynamics in the estuary works and what causes changes in water quality conditions are generated by monitoring programs. The purpose of monitoring programs is generally to assess the status, and when extended over time and space, the trends for whatever is of concern and is being measured. Data generated from this framework are not designed to answer questions of cause and effect, source identification and other 'why' and 'how' questions; these require specific studies designed to answer them or to address hypotheses. The second fact is that there have been few or no published studies designed to answer these questions.

The comments below have been generated from our collective memory, or a quick reference to existing studies. We will not respond to these questions in depth because it would take significant time and effort to provide more thorough answers.

Transparency-related issues:

#1- NO

There are several aspects to this question that are assumptions not necessarily backed up by any available data, including 'increase in phytoplankton growth', and 'lowering water column transparency...', let alone the relationship between TN, chlorophyll *a* and transparency measures. The only measures of phytoplankton growth that we are aware of are the respiration measures conducted in the Squamscott River in 2011 as part of the Coalition-funded study; otherwise, phytoplankton population dynamics are inferred from chlorophyll *a* data collected as part of monitoring studies, that include a few more detailed studies like the early studies conducted by Langan as part of the early NERR monitoring program during phytoplankton blooms in Great Bay and the various spatially-intensive DO-water quality studies

conducted by Pennock (Lamprey), Jones (Squamscott & Lamprey), and the 2011 Coalition study in the Squamscott River that included measures of chlorophyll *a*. Otherwise, there are no places where we are aware of documented increasing phytoplankton populations, and in many areas chlorophyll *a* remains present at relatively low levels. Many areas of the estuary are turbid due to CDOM and suspended sediments, the latter is largely a function of re-suspension events caused by wind and waves at low tide across the shallow areas of the estuary and by relatively rare large scale runoff events. As for changing TN levels, even at Adams Point there has been little change since the late-1980's, and a review of the NHEP Technical Characterization Report (Jones 2000), authored by ALL JEL scientists, N levels in GBE tributaries (Oyster, Lamprey, Bellamy) were lower during the 1990's than during the late 1970's.

#2-There are two questions here; YES, to the first part (a) and NO to the second part (b).
a) YES. The study by Morrison et al. found phytoplankton/chlorophyll *a* concentration-related contribution to transparency limitation in Great Bay to be 12% (Great Bay buoy) of the total limitation from all factors; CDOM, water and suspended sediments were the major factors. The study did not include eelgrass growth measures. There was one verbalized interpretation of this finding at a TAC meeting where Morrison presented the results of his study that was not backed up by any analysis, yet it was accepted by some as feasible and promulgated thereafter, that even this relatively small influence was, "...enough to limit eelgrass growth..."
b) NO. Given the small degree to which phytoplankton contributes to transparency limitation, reductions in TN were not discussed in this report. TN reductions would not appear to provide much in the way of improving transparency through this mechanism, although no study has been conducted to address this. Given the large reserve of TN in sediments and its efflux during warm months to the water column, reducing TN loading may not have much influence on TN levels in the estuary for quite some time. What the study did state in the Executive Summary was that "...it would be predicted that water clarity in Great Bay, Little Bay and the Lower Piscataqua River was sufficient for eelgrass growth. Absence of eelgrass from any one of these areas is suggestive of factors other than water clarity controlling eelgrass distribution".

#3-NO & YES
We believe the habitat restoration document (O'Dell et al.) suggested that eelgrass restoration in a few of the rivers (Squamscott) is not feasible in part by poor transparency, although we'd have to go back and look at that. As well, it is well established that eelgrass will not grow in water that is too deep, so transparency becomes a factor limiting it's establishment and growth at lower depths within the estuary. For areas where it is and has been present, i.e., some of the shallow areas of the estuary, transparency has not, to our knowledge, been demonstrated as a primary factor limiting growth; myriad other factors have been cited as being primary limiting factors. Also see previous answer for a direct response to this question.

#4-NO
We have not seen any analysis, or even a comprehensive consideration of all of these factors that would enable discerning the relative influence of each on what happened to eelgrass in 2006. Emerging research on sediment re-suspension in Great Bay suggest extreme runoff events, like what happened during 2006, cause highly significant sediment re-suspension.

Nitrate toxicity:

#5: NO
No studies on nitrate toxicity in eelgrass in the GBE have been conducted, and we are not aware of any study showing this was a factor in 2006. This seems to be highly speculative, especially because nitrate levels did not change that drastically in 2006 compared to other years.

Dissolved oxygen impacts:

#6: NO
This question is a bit strange in that algal growth assumes photosynthesis and under these conditions DO is increased; at night algae respire and take up oxygen and can cause lower DO levels to occur. A 2005 study by Jones in the Squamscott River was designed to capture this latter condition by conducting river length surveys early in the morning under tidal conditions that were most frequently associated with

lower DO levels. That study and a similar one (Jones 2007) did not reveal any extensive low (<5 mg/L) levels, and low DO levels that did occur were not correlated with chlorophyll *a* levels.

Macroalgae impacts:

#7: a qualified "NO"
Most studies addressing the decline of eelgrass list an array of factors affecting eelgrass populations in Great Bay. There are sparse data on macroalgae biomass trends, the little available data, along with many anecdotal accounts, suggest increases have occurred, although it is also well accepted that macroalgal blooms are ephemeral and unpredictable. There was a study that mapped eelgrass and macroalgae (Pe'eri et al. 2008) that left many suggestions for future studies but few conclusions from their actual study, and no conclusions of cause and effect. One weakness of their project was there was no ground-truthing of eelgrass at the time of the study. Given the accepted concept of how ephemeral macroalgal mats are in the estuary, this was acknowledged to be a significant factor that should be required in any new studies. No studies have demonstrated mechanisms for macroalgae growth causing decreases in eelgrass populations.

#8: NO
Not much data are available on this, though many people weigh in with anecdotal input that this may be happening. Our personal observations are that there has been an increased presence of macroalgae in intertidal and shallow subtidal areas of tidal rivers where water salinity is high enough, but its occurrence is ephemeral and not consistent over time, within seasons and between years. How this would affect establishment of eelgrass in the rivers is not something anyone has studied, to our knowledge.

In closing and with regards to your suggestion that we comment about types of research that need to be funded to answer these questions, please realize that in a climate of limited resources, these issues are among many that should be investigated through funded research to provide answers for critical problems in the NH Seacoast. The best next step in terms of prioritization of research and monitoring efforts should be in the context of all critical issues, to enable synergistic studies that can address multiple issues and thus leverage limited resources in the most efficient way possible. There are always new research efforts underway, including some addressing questions related to nutrient dynamics in the estuary.

Sincerely,

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CITY OF PORTSMOUTH

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Eric A. Spear
Mayor

January 1, 2013

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**Re: Request for Input on Results of Prior Research Conducted to Evaluate Nutrient Impacts on Great Bay Estuary**

Dear Drs. Pennock, Langan and Jones:

I am writing this letter on behalf of the Cities of Dover, Rochester and Portsmouth. Our communities (as well as the smaller towns throughout the Great Bay watershed) are in desperate need of an objective scientific assessment on the degree to which nutrient loadings have been demonstrated to be the cause of eelgrass population changes and reduced DO in the Great Bay system. As you are aware, EPA has proposed extremely restrictive total nitrogen (TN) reduction requirements for both the Newmarket and Exeter wastewater facilities and plans to impose

similar requirements on other facilities throughout the system. In addition, EPA has specified that unless non-point sources of TN are greatly reduced, EPA will likely impose effluent limits on wastewater discharges in the range of 0.3 mg/l TN, which is beyond the capability of any available technology to achieve. Financing the type of improvements being mandated by EPA will likely approach or exceed a billion dollars, causing serious financial harm to the communities which are impacted by these costs for decades to come and preclude expenditure of municipal resources on other necessary projects (schools, hospitals, welfare services, technical research, etc.). As an alternative, our communities have supported a proactive approach to (1) ensure TN levels are controlled to prevent future increases, (2) conduct necessary research on system needs, and (3) implement other ecologically beneficial projects via adaptive management. EPA, however, has thoroughly rejected this concept focusing solely on stringent TN reduction measures as the solution to protecting system ecology.

EPA's regulatory decisions are premised on a number of scientific findings that the Agency claims to be demonstrated by the data and studies developed for the Great Bay estuary. The Jackson Laboratory and UNH were involved in the vast majority of the studies referenced by EPA. The EPA claims include the following:

- Data from the Estuary confirm that TN increases caused a significant increase in phytoplankton growth impairing water column transparency throughout the system.
- Studies demonstrated that water column transparency decreases related to TN induced algal growth caused the major reduction in eelgrass acres that occurred between 2006-2008.
- Studies confirmed that low DO occurring in the Lamprey and Squamscott River was caused by excessive algal growth.
- Studies demonstrate that eelgrass populations in the system are suffering from nitrate "toxicity".
- Macroalgae growth has been confirmed to be a major cause of changing eelgrass populations in Great Bay.
- Studies demonstrated that the floods occurring in 2006 were not the primary cause of eelgrass losses occurring in the system shortly thereafter.

Our communities are keenly interested in protecting the resources of Great Bay and supporting research necessary to ensure future generations will enjoy the same benefits. We understand that there are a wide range of important ecological factors that need to be evaluated and addressed to protect the system's ecology (e.g., oyster restoration, shoreline protection, marsh restoration, etc.). However, EPA's single minded focus on TN reduction will preclude all future investments in such research and restoration efforts as all available resources for decades to come will be committed to the "EPA TN solution." Thus, we are at a crossroads and we need to know whether the claims being made by EPA are reasonably supported by research conducted for this system.

You are three of the most knowledgeable and objective individuals regarding Great Bay research and studies – you have participated on the PREP Technical Advisory Committee and participated in many studies on the key tidal rivers and bay areas EPA is referencing. Attached is a short list of questions regarding the data and research that has been conducted for this system. Your

prompt and concise response to these questions would be most appreciated and should help to ensure that future investments in protecting the system are properly directed. Thank you in advance for your assistance, it is most appreciated.

Sincerely,

Eric Spear, Mayor
City of Portsmouth

Dean Trefethen, Mayor
City of Dover

T.J. Jean, Mayor
City of Rochester

Attachment

## Questions on Prior Research Findings for Great Bay Estuary

Please provide answers to the following question; if you have specific knowledge of the data and studies conducted for the Estuary regarding the topic of concern, please generally identify the information source (e.g., PREP water quality database, State of the Estuary Report , study for a particular area). The answers should avoid speculation and only present positions that represent your personal knowledge of data and research for this system. If there are specific research needs to resolve the question please let us know the type of research that needs to be funded.

**Transparency-related issues**

1. Has data collected for the estuary confirmed that changing TN levels have caused an increase in phytoplankton growth, significantly lowering water column transparency in Great Bay, Little Bay or the Piscataqua River?

2. Have studies determined the degree to which phytoplankton growth impacts transparency in this system and that it is a significant factor presently limiting eelgrass growth? Do these studies indicate that reducing TN levels is likely to result in a significant improvement in water column transparency for either Great Bay or the tidal rivers?

3. Do studies or available data confirm that water column transparency is a primary factor presently limiting eelgrass growth and restoration in Great Bay, Little Bay and/or the Lower Piscataqua River?

4. Have studies determined that the significant eelgrass declines which occurred systemwide in 2006 were <u>not</u> due to the impacts of excessive rainfall occurring that year but were caused by TN related impacts due to excessive nuisance algal growth?

**Nitrate Toxicity**

5. Have studies for the Great Bay system demonstrated that eelgrass populations are being adversely impacted by nitrate toxicity and that was a factor in the significant eelgrass decline that occurred systemwide in 2006?

**DO Impacts**

6. Have studies in either the Squamscott or Lamprey Rivers confirmed that algal growth in those rivers is the major cause of the periodic low DO observe in those rivers?

**Macroalgae Impacts**

7. Have studies of Great Bay demonstrated that increased macroalgae growth is the primary reason for decreases in eelgrass populations in that water body and that reduction in TN levels will abate such excessive plant growth?

8. Is significant macroalgae growth occurring in the tidal rivers and if so, does it present a significant obstacle to allowing eelgrass restoration in the tidal rivers?